IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1 1.   (previously presented) A method for addressing a mobile node, comprising the
2 steps of:
3   identifying a mobile node to a corresponding node, with which the mobile node
4 communicates, at a level above a network level using an invariant virtual internet
5 protocol (IP) address of the mobile node;
6   identifying the mobile node to a network address translation (NAT) device at a
7 network interface level using a routable actual IP address of the mobile node; and
8   changing the actual IP address of the mobile node used by the NAT device, and a
9 rule for mapping the actual IP address to the virtual IP address, without varying the
10 virtual IP address of the mobile node used by the corresponding node, as the mobile node
11 moves intra-domain or inter-domain.

1 2.   (original) The method of claim 1, wherein the virtual IP address is used for
2 maintaining a transport level protocol connection while the mobile node moves between a
3 first subnet and a second subnet.

1 3.   (original) The method of claim 1, further comprising:
2   receiving a packet from an application in the mobile node, the packet including
3 the virtual IP address of the mobile node as a source address;
4   translating the virtual IP address of the mobile node to the actual IP address of the
5 mobile node for use as the source address; and
6   transmitting the packet with the actual IP address from the mobile node.

1 4.   (original) The method of claim 3, wherein the actual IP address is a local private
2 address, the method further comprising:

3   translating the actual IP address of the mobile node to a public IP address; and

4   transmitting the packet with the public IP address to the corresponding node, the

5 mobile node and the corresponding node being in different domains connected to each

6 other by a public network.

1 5.   (original) The method of claim 4, further comprising:

2   receiving an incoming packet from the corresponding node in the NAT device,

3 the incoming packet having the public IP address as a destination;

4   a first translating step of translating the public IP address to the actual IP address

5 of the mobile node, the first translating step being performed in the NAT device;

6   a second translating step of translating the actual IP address of the mobile node to

7 the virtual IP address of the mobile node, the second translating step being performed in

8 the mobile node; and

9   providing the incoming packet with the virtual IP address as a destination for

10 delivery to the application in the mobile node.

1 6.   (original) The method of claim 1, further comprising:

2   transmitting a packet from an application in the mobile node to the corresponding

3 node, the transmitted packet having the virtual IP address of the mobile node as the

4 source address, the mobile node and the corresponding node belonging to different

5 subnets within a common domain; and

6   receiving an incoming packet from the corresponding node by way of the NAT

7 device, wherein the NAT device translates a destination address of the incoming packet

8 from the virtual IP address of the mobile node to the actual IP address of the mobile node.

1 7.   (original) The method of claim 6, wherein the corresponding node is a second

2 mobile node, and the transmitted packet has a destination address that is a virtual IP

3 address of the corresponding node, and the packet is transmitted to the corresponding

4 node by way of the NAT device, the method further comprising:

5   translating the virtual IP address of the corresponding node within the packet to

6 an actual IP address of the corresponding node in the NAT device.

1   8.   (original) The method of claim 7, wherein the transmitted packet is transmitted to

2   the corresponding node by way of the NAT device, the method further comprising:

3   translating the source address of the transmitted packet from the actual IP address

4   of the mobile node to the virtual IP address of the mobile node, in the NAT device.

1   9.   (original) The method of claim 1, further comprising:

2   using the NAT device within a first NAT domain as a home agent for the mobile

3   node while the mobile node communicates with a first corresponding node in a first

4   connection initiated while the mobile node is located in the first NAT domain; and

5   using a second NAT device within a second NAT domain as a home agent for the

6   mobile node while the mobile node communicates with the first corresponding node or a

7   second corresponding node in a second connection initiated while the mobile node is

8   located in the second NAT domain.

1   10.   (original) The method of claim 9, further comprising using a packet processing

2   rule for processing traffic from the mobile node, while the mobile node is in the second

3   NAT domain, the packet processing rule being obtained from a device in the first NAT

4   domain.

1   11.   (original) The method of claim 10, wherein when the mobile node moves from the

2   first NAT domain to the second NAT domain, a mobility manager in the second NAT

3   device requests and receives the packet processing rule from a mobility manager of the

4   first NAT domain, wherein the first and second mobility managers have centralized

5   views of users in the first and second NAT domains, respectively, and mappings between

6   virtual IP addresses and actual IP addresses of the users currently in the first and second

7   NAT domains, respectively.

1   12.   (original) The method of claim 9, wherein the first and second connections

2   partially overlap in time, so that the first and second NAT devices act as first and second

3   home agents for the mobile node concurrently.

1   13.   (original) The method of claim 12, wherein the mobile node has the same virtual

2   address for both the first and second connections.

1   14.   (original) The method of claim 12, wherein an additional node in the second NAT

2   domain has the same virtual address as the mobile node, the method further comprising:

3   assigning a second virtual address to the mobile node for connections initiated

4   after the mobile node moves to the second domain; and

5   continuing to use the first virtual address for connections initiated by the mobile

6   node using the first virtual address, the continuing use of the first virtual address being

7   concurrent with use of the second virtual address for connections initiated after the

8   second virtual address is assigned to the mobile node.

1   15.   (original) The method of claim 1, further comprising:

2   assigning the virtual and actual IP addresses using Dynamic Host Configuration

3   Protocol.

1   16.   (original) The method of claim 1, further comprising translating the virtual IP

2   address to a public IP address in the NAT device.

1   17.   (original) The method of claim 1, further comprising dividing an available range

2   of private IP addresses into a first range to be used for actual IP addresses and a second

3   range to be used for virtual IP addresses.

1   18.   (original) A mobile node, comprising:

2   a processor;

3   a network interface; and

4   a storage device having computer program code therein for execution by the

5   processor, the computer program code including:

6   a network layer for transmitting and receiving packets; and

7   an intermediate driver that transmits packets to the network layer and receives

8   packets from the network layer using a virtual internet protocol (IP) address to identify

9　the mobile node, the intermediate driver transmitting packets to the network interface and
10　receiving packets from the network interface using a routable actual IP address to identify
11　the mobile node, wherein the intermediate driver permits the actual IP address to change
12　when the mobile node moves intra-domain or inter-domain without a corresponding
13　change in the virtual IP address.

1　19.　(original) The mobile node of claim 18, wherein the intermediate driver includes
2　means for changing a source IP address of packets transmitted by the mobile node from
3　the virtual address to the actual address.

1　20.　(original) The mobile node of claim 18, wherein the intermediate driver includes
2　means for encapsulating packets transmitted by the mobile node.

1　21.　(original) The mobile node of claim 18, wherein the intermediate driver includes
2　means for changing a destination IP address of packets received by the mobile node from
3　the actual address to the virtual address.

1　22.　(original) The mobile node of claim 18, further comprising means for requesting
2　and receiving from a dynamic host configuration protocol (DHCP) server the virtual IP
3　address and the actual IP address upon startup of the mobile node.

1　23.　(original) The mobile node of claim 22, further comprising means for transmitting
2　the virtual IP address to the DHCP server when the mobile node moves to the second
3　subnet, to allow a new actual IP address to be associated with the virtual IP address.

1　24.　(original) The mobile node of claim 18, further comprising a mobile IP client that
2　transmits and receives packets by way of the network layer, the intermediate driver and
3　the network interface.

1　25.　(withdrawn) A dynamic host configuration protocol (DHCP) server, comprising:
2　　　　means for receiving a DHCP request from a mobile node;

3   means for assigning a routable actual IP address to the mobile node;

4   means for assigning a virtual IP address to the mobile node, wherein the virtual IP

5   address does not change when the mobile node moves intra-domain; and

6   means for transmitting a message to the mobile node containing the actual IP

7   address and the virtual IP address.

1   26.   (withdrawn) The DHCP server of claim 25, wherein the mobile node sends the

2   DHCP server a further request to renew a lease of the actual IP address, the DHCP server

3   further including:

4   means for determining whether the mobile node is currently located in the first

5   subnet; and

6   means for denying the further request if the mobile node is in the second subnet.

1   27.   (withdrawn) The DHCP server of claim 26, wherein the mobile node sends the

2   DHCP server a new request identifying the virtual IP address when the further request is

3   denied, the DHCP server further including:

4   means, responsive to the new request, for assigning a new actual IP address to the

5   mobile node; and

6   means for notifying a mobility manager function to initiate a change to a mapping

7   table in a network address translation device so that the new actual IP address

8   corresponds to the virtual IP address in the mapping table.

1   28.   (withdrawn) A system including a network address translation (NAT) device, the

2   NAT device comprising:

3   means for receiving a plurality of packets identifying a virtual IP address of a

4   mobile node coupled to the NAT device as a destination;

5   means for identifying an actual IP address of the mobile node based on the virtual

6   IP address, the identifying means being capable of associating a first actual IP address

7   with the mobile node while the mobile node is located in a first subnet, the identifying

8   means being capable of associating a second actual IP address of the mobile node with

9 the same virtual IP address when the NAT device is notified of mobility of the mobile

10 node; and

11   means for routing the packets to the mobile node using the first IP address when

12 the mobile node is in the first subnet and the second IP address when the mobile node is

13 in the second subnet.

1 29.   (withdrawn) The system of claim 28, further comprising a dynamic host

2 configuration protocol (DHCP) server that assigns the virtual IP address and the actual IP

3 address to the mobile node.

1 30.   (withdrawn) The system of claim 29 wherein:

2   the identifying means include a plurality of packet processing rules, and

3   the system further comprises a mobility manager responsive to the DHCP server

4 for updating the packet processing rules when the DHCP server assigns one of the first

5 and second actual IP addresses to the mobile node, to associate one of the first and

6 second actual IP address with the virtual IP address, the mobility manager having a

7 centralized view of users in a domain of the NAT device.

1 31.   (withdrawn) The system of claim 30, further comprising a mobile node including:

2   a processor;

3   a network interface; and

4   a storage device having computer program code therein for execution by the

5 processor, the computer program code including:

6   a network layer for transmitting and receiving packets; and

7   an intermediate driver that transmits packets to the network layer and receives

8 packets from the network layer using the virtual IP address to identify the mobile node,

9 the intermediate driver transmitting packets to the network interface and receiving

10 packets from the network interface using the actual IP address to identify the mobile

11 node,

12   wherein the NAT device transmits packets to the network interface and receives

13 packets from the network interface using the actual IP address.

1   32.   (withdrawn) The system of claim 30, wherein the mobility manager and the

2   DHCP server are contained within a housing of the NAT device.

1   33.   (withdrawn) The system of claim 30, wherein the DHCP server includes means,

2   responsive to a request for a new actual IP address, for assigning the second actual IP

3   address to the mobile node and notifying the mobility manager means that the virtual IP

4   address is to be associated with the second actual IP address.

1   34   (withdrawn) The system of claim 28, further comprising a mobility manager,

2   responsive to a notification of a movement by the mobile node, for notifying the NAT

3   device that the mobile node has a new actual IP address.